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THE TRIANGULAR QUADRANT: OR *The QUADRANT on a SECTOR.*

Being a general Instrument

For Land or Sea Observations.

Performing all the Uses of the ordinary Sea Instruments; as *Davis Quadrant*, *Foreſtaff*, *Croſsſtaff*, *Bow*, With more eaſe, profitableneſs, and conveniency, and as much exactneſs as any or all of them.

Moreover,

It may be made a particular, and a general *Quadrant* for all latitudes, and have the *Sector* lines alſo.

To which is added a *Rectifying Table*, to find the Suns true Declination to a minute or two, any day or hour of the 4 years: Whereby to find the latitude of a place by a *Meridian*, or any two other altitudes of the Sun or Stars.

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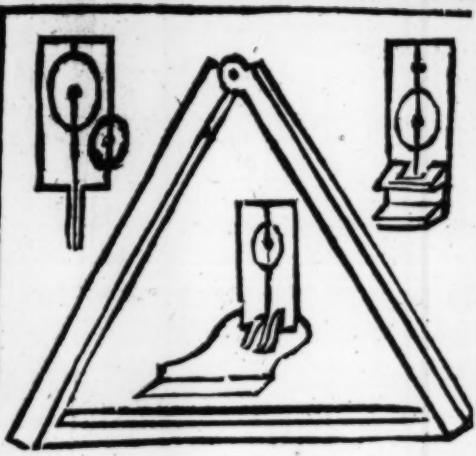
First thus Contrived and made by *John Browne* at the *Sphere* and *Dial* in the *Minories*, and to be ſold at his houſe, or at *Hen. Sutton's* in *Threadneadle-ſtreet* behind the *Exchange*.

1662.



THE TRIANGULAR QUADRANT:

Being a

GENERAL INSTRUMENT

for Obſervations at *Land* or *Sea*, performing all the Uſes of all ordinary *Sea Inſtruments* for *Obſervations*, with more ſpeed, eaſe and conveniencie than any of them all will do.

Contrived and made by *John Browne* at the *Spheare* and *Sun-dial* in the *Minories*, and ſold there or at Mr *H. Suttons* behind the *Exchange*. 1662.

THE Description, and some uſes of the *Triangular Quadrant*, or the Sector made a Quadrant, or the uſe of an excellent Inſtrument for obſervations at Land or Sea, performing all the uſes of the *Foreſtaff*, *Davis quadrant*, *Bow*, *Gunter's croſſtaff*, *Gunter's quadrant*, and *ſector*; with far more convenience and as much exactneſs as any of them will do.

The Deſcription.

Firſt, it is a jointed rule (or Sector) made to what Radius you pleaſe, but for the preſent purpoſe it is beſt between 24. and 36 inches Radius, and a third peice of the ſame length, with a tennon at each end, to make it an Equilateral Triangle; from whence it is properly called a *Triangular Quadrant*.

Secondly, as to the lines graduated thereon, they may be more or leſſe as your uſe

uſe and coſt will pleaſe to command, but to make it compleat for the promiſed premiſes, theſe that follow are neceſſary thereunto.

1. A Line of *degrees*, of twice 90. degrees on the moveable leg, and outer edge of the croſs piece: for quadrantal and back obſervations.

2. Such another Line of 60. degrees, for forward obſervations on the inſide of the croſs piece.

3. On the moveable leg, a Kallender of Months, and dayes in 2 lines.

4. Next to them, a Line of the Suns place in degrees.

5. Next to that, a Line of the Suns right Aſſention, in degrees or hours.

6. Next above the Months on the ſame Leg, an hour and Azimuth Line, fitted to a particular Latitude, as *London*, or any other place, for all the uſes of *Gunter's* Quadrant as you may find in the former diſcourſe (called a Joynt-rule.)

7. On the head leg, and ſame ſide, a particular ſcale of altitudes, for the particular Latitude.

8. Next to that a general ſcale of Altitudes, for all Latitudes.

9. A Line of 360 degrees, divided ſo as to ſerve for 360 degrees of 12 Signs; and 24 hours, (and in foot and 2 foot rules for inches alſo.)

10. A Line of 29 ½ laid next to the former, ſerving to find the Moons coming to South, and her age, and place, and the time of the Night, by the fixed Stars.

11. A perpetual Almanack, and the right Aſſenſion, and declination of ſeveral fixed Stars.

12. A Line of Lines next the inſide, may be put on without Trouble, or incumbering one another, all theſe on one ſide.

Secondly, on the other ſide may be put the Lines of *natural Signs*, *Tangents* and *Secants*, to a ſingle, double, and treble Radius, and by this means more then a *Gunters Sector*, (the particular Lines being inſcribed between the general Lines.)

Thirdly on the other edge there may be Artificial *Numbers*, *Tangents*, *Signs*, and *verſed Signs*, and by this means it is a *Gunters* Rule or a *Croſſtaff*.

Fourthly, on the inſides, *inches*, *foot-meaſure*, and a Line of 112. parts, and a large *meridian Line*, or the like: as you pleaſe.

Laſtly, two ſliding nuts with points in them, fitted to the Croſs piece, makes it a proper beam Compaſs to uſe in working by the Numbers Signs and Tangents on the edge, or flat ſide, alſo it muſt have four or five ſights, a Thred, and Plummet, and Compaſſes, as other inſtruments have, thus much for the Deſcription, the uſes follow.

An *Advertiſement.*

Firſt, for the better underſtanding and brevity ſake, there are ten things to be named and deſcribed, as followeth; 1. the *head leg*, in which the braſs Revet is fixed, and about which the other turn; 2. the *moveable leg*, on which the Months and Days muſt always be; 3. the *Croſs piece*, that is fitted to the head, and moveable Leg, by the two Tennons at the end; 4. the *quadrant ſide* where the degrees and Moneths are, for obſervation. 5. the other or *Sector ſide* for operation, 6thly the *head center*, being Center to the degrees on the inſide of the croſſe peece, for a forward obſervation as with the foreſtaffe. 7 The other Center, near the end of the head leg, being the Center to the moveable leg, for backward obſervations, (as the Davis quadrant is uſed, and the bow) which you may call the *foot center*, or *leg center* for backward obſervations.

8thly the ſights, as firſt the *turning* or eye *ſight*, which is alwayes, ſet on one of the centers, with a ſcrew to make it faſt there, which I call the *turning ſight*, 9thly the *Horizon ſight* that cuts the degrees of altitude, and ſometimes is next to the eye, and ſometimes remote from the eye, yet called the *horizon* (ſl deing) *ſight*, 10thly. the *object* or *ſhaddow ſight* of which there may be 3 for convenience ſake, as two fixed

and

and one moveable to ſlide as the horizon ſight doth: the other two do ſerve alſo to pin the croſſe peece, and the two legs together, through the two tennons, all whoſe names in ſhort take thus:

1. The *head* leg: 2. the *moveable leg*: 3. the *croſſe peece*: 4. the *quadrant ſide*: 5. the *ſector ſide*, 6. the *head* (or forward) *center*. 7 the *leg* (or backward) *center*. 8. the *turning ſight*. 9. the (ſlideing) *horizon ſight*. 10. the *object* (or ſhaddow) *ſight*. of which there be 3. all differing according to your uſe and occaſions: one to ſlide to any place, the other 2. to be put into certain holes, nigher, or further off: as will afterwards largely appear.

THE USES:

1. *To find the ſuns declination, true place, right aſſention, and riſing, the day of the moneth being given.*

Firſt open the rule to an angle of 60. degrees, which is alwayes done when the croſs peece is fitted into the Morteſſe holes, and the pins of the *object ſights* put in the holes through the tennons, or elſe by the ſecond Chapter of the Joynt-rule: then extend a thred from the center pin in the head leg, to the day of the month, & on the degrees it curs the ſuns declination, in the line of right aſſention his right aſſention, in the line of true place his true place, and in the hour line his true riſing and ſetting,

in

in that latitude the line is made for: Example, on the first of May I would know the former questions, the rule being set by the crosse peece, and the thred on the *leg center* pin; and drawn straight and laid over May 1. it cuts in the degrees 18. 4. north declination, and 20. 58. in ♉ Taurus for his place, and 3 hours 14. minutes right assention in time, or 48. 32. in degrees: and the rising of the sun that day is at 4. 23, and sets at 5. 37, in 51. 32 latitude.

The finding of hour and azimuth, either particularly, or generally, with other Astronomical propositions, are spoken enough of before in the Joynt-rule, and in all other authors that write of the Sector, or *Gunter's* rule, so that all I shall speak of now, shall be onely what was forgot in the first part, and what is new as to the using the instrument in sea observations.

II. *To find the Suns or a Stars Altitude, by a forward Observation.*

Skrew the turning sight to the *head center*, and set that *object sight*, whose holes answer to the Sliding *horizon sight*, in the hole at the end of the *head leg*, and put the horizon sight on the crosse peece next the inside; Then holding the crosse peece with your right hand, and the turning sight close to your eye, and the moveable leg against your body, with your thumb

on the right hand thruſt upwards, or pull downwards, the horizon ſight: till you ſee the ſun through the object ſight, and the horizon through the horizon ſight, then the degrees cut by the middle of the horizon ſight, on the croſſe peece ſhall be the true altitude required:

III. *To perform the ſame another way.*

If your inſtrument be parted, that is to ſay the croſſe peece from the other, and an altitude be required to be had quickly, then ſet the two object ſights, in two holes at the end of the line of naturall ſigns, then ſet the head of the rule to your eye, ſo as the ſight of the eye may be juſt over the Center, then open or cloſe the Joynt, till you ſee the horizon through one ſight, and the ſun or ſtar through the other, then is the ſector ſet to the angle required, to find which angle do thus, take the parallel ſign of 30 and 30, and meaſure it from the Center, and it ſhall reach to the ſign of half the angle required.

Example.

Suppoſe I had obſerved an altitude, and the diſtance between 30 and 30, ſhould reach from the center to 10. degrees on the ſigns, then is the altitude of the ſun 20. degrees for 10 doubled is 20.

IIII. *To find the ſuns Altitude by a back obſervation,*

Skrew the Turning ſight to the leg cen-

ter, (or center to the degrees on the moveable leg) and put one of the object sights, in the hole by 09. on the outer edge of the crosse peece, and set the edge of it just against the stroke of 09, or you may use the sliding object sight and set the edge or the middle of that, to the stroke of 00, as you shall Judge most convenient; and the horizon sight to the moveable leg, then observe in all respects as with a Davis quadrant, till looking through the small hole of the horizon sight, you see the crosse bar and button, in the turning sight, cut the horizon: and at the same instant the shadow of the edge or middle of the object or shadow sight, fall on the middle of the turning sight, by sliding the horizon sight higher or lower, then the middle stroke of the horizon sight, shall cut on the moveable leg, the suns true altitude required. As if it stay at 50 degrees, then is the sun 50 degrees above the horizon.

V. But if the sun be near to the Zenith or 90 degrees high, then it will be convenient to move the object sight, to a hole or two further as suppose at 10, 20, 30 degrees more, toward the further end of the crosse peece and then observe as you did before in all respects, as with a Davis quadrant, and then whatsoever degrees the horizon sight cuts, you must ad so much to it, as you set the object sight forwards, as suppose 30, and

the

the horizon sight stay at 60, then I say 60, and 30, makes 90: the true altitude required. Note that by this contrivance, let the altitude be what it will, you shall always have a most steady observation: with the instrument leaning against your breast, a considerable thing, in a windy day, when you may have a need of an observation in southern voyages, when the sun is near to the zenith at a Meridian observation.

VI. *To find the suns distance from the zenith, by observing the other way, the sun being not above 60 degrees high, or 30 from the zenith.*

Set the turning sight as before on the leg Center, then set an object sight in one of the holes in the line on the head leg, nigher or further of, the turning sight: as the the brightnesse or dimnesse of the sun will allow to see a shadow, then looking through the small hole on the horizon sight, till you see the horizon cut by the crosse bar of the great hole, in the turning sight, turning the foreside of that sight, till it be fit to receive the shadow of the middle of the object sight; then the degrees cut by the horizon sight, shall be the suns true distance from the zenith, or the complement of the Altitude.

VII. Note that by adding of a short peece about 9 inches long on the head leg, whereon

to ſet the ſlideing ſhadow ſight, you may obtain the former convenience of all angles, this way alſo, at a moſt ſteady and eaſie manner of obſervation; but note whatſoever you ſet forwards on that peece, muſt be ſubſtracted from that the ſight ſheweth, and the remainder ſhall be the ſuns diſtance from the zenith required.

As ſuppoſe you ſet forward 30 degrees, and the horizon ſight ſhould ſtay at 40, then 30 from 40 reſt 10, the ſuns diſtance from the zenith required; thus you ſee, that by one and the ſame line, at one manner of figuring, is the ſuns altitude, or coaltitude acquired and that at a moſt certain ſteady manner of obſervation.

VIII. *To find an obſervation by thred and plummet, without having any reſpect to the horizon, being of good ſtead in a miſty or cloudy day at land or ſea.*

Set the rule to his angle of 60 degrees by putting in the croſſe peece, then skrew the turning ſight to the head center, then if the ſun or ſtar be under 30 degrees high, ſet the object ſight in the moveable leg, then looking through the ſmall hole in the turning ſight, through the object ſight, to the middle of the ſtar or ſun, as the button in the croſſe bar will neatly ſhew; then the thread and plummet, hanging on the leg center pin, and playing evenly by the moveable leg, ſhall ſhew the true altitude

of

of the ſun, or ſtar required counting the degrees as they are numbred, for th: north declinations from 60 toward the head with 10 20, As if the thred ſhall play upon 70 | 10 then is the altitude 10 degrees.

IX But if the ſun or ſtar be above 30 degrees high, then the obje&t ſight muſt be ſet to the hole in the end of the head leg: then looking as before, and the thred playing evenly by the moveable leg, ſhall ſhew the true altitude required, as the degrees are numbred.

Note that if the brightneſſe of the ſun ſhould offend the eye, you may have a peice of green, blew, or red glaſſe, fixed on the turning ſight, or elſe remove the obje&t ſight nearer to the turning ſight, and then let the ſun beams pierce through both the ſmall holes, according to the uſuall manner and the thred ſhall ſhew the true altitude required. Note alſo if the thred be apt to ſlip away from his obſerved place, as between 25 and 40 it may: note a dexterious handling thereof will naturally ſhew you how to prevent it:

X. *To find a latitude at Sea by forward meridian Obſervation or Altitude.*

Set the moving obje&t Sight to the Suns declination, ſhewed by the day of the Month, and rectifying Table, and skrew the turning ſight to the leg center, and the Horizon ſight to the moveable leg, or the

outſide

outside of the Crosse piece, according as the Sun is high or low (but note all forward observations respecting the Horizon, ought to be under 45 degrees high, for if it be more it is very uncertain, by any Instrumens whatsoever, except you have a Plummet and then the Horizon is useleſſe) then observe just as you do in a forward observation, moving the Horizon sight till you see the Sun through the Horizon sight, and the Horizon through the object sight, or the contrary. (moving not that sight that is set to the day of the Month or Declination,) then whatsoever the moving sight shall shew, if you add 30 to it, it shall be the latitude of the place required; observing the difference in North and South Latitudes; that is, setting the sight to the proper declination, either like, or unlike, to the latitude.

Example. Suppose on the 10. of *March* when the Suns declination is 0--10. North; as in the first year after leap year it will be, set the stroke in the middle of the moving object sight to 10' of North Declination, and the Horizon sight on the moveable leg, then move it higher or lower, till you see the Horizon through one, and the Sun through the other, then the degrees between, is the Suns meridian altitude, if it be at Noon, as suppose it stayed at 21 30, then by counting the degrees between,

you

you ſhall find them come to 38. 40. then if you add 30. to 21. 30. it makes 51. 30. the Latitude required, for if you do take o 10′ minutes from 38. 40. there remains 38. 30. the complement of the Latitude. Note, that this way you may take a forward obſervation, and ſo ſave the removing of the urning ſight.

Note alſo, That when the Horizon ſight ſhall ſtay about the corner, you may move the object ſight 10. or 20. degrees towards the head, and then you muſt add but 20. or 10 degrees to what the ſight ſtayed at; or if you ſhall ſet the ſight the other way 10 or 20. degr. then you muſt add more then 30 ſo much. As ſuppoſe in this laſt obſervation, it had been the latitude of 45 or 50 degrees, then you ſhall find the ſight to play ſo neer the corner, that it will prove inconvenient, then ſuppoſe inſtead of o 10. I ſet it to 20 degrees 10′ North declination, which is 20. degrees added to the declination, then the Suns height being the ſame as before, the ſight will ſtay at 41. 30. to which if you add 10 degrees, it doth make 51. 30. as before; here you muſt add but 10 degrees, becauſe you increaſed the declination 20. degrees; but note by the ſame reaſon, had you ſet it to 19. 50. South declination, then it had been diminiſhed 20 degrees, and then inſtead of 30 you muſt add 50. to 1 - 30. the place where

the

the ſight would have ſtayed. Thus you ſee you may very neatly avoid this inconvenience, and ſet the ſights to proper and ſteady obſervations, at all times of obſervation.

XI. *To find the latitude by a backward Meridian Obſervation at Sea.*

This is but juſt the converſe of the former, for if you ſet one ſight to the declination, either directly, (or augmented or diminiſh'd as before, when the moving ſight ſhall ſtay, about the corner of the *Triangular Quadrant*) then the other being ſlipt to and fro, on the outſide of the Croſſe peece, till the ſhadow of the outer edge, ſhall fall on the middle of the turning ſight, then 30 juſt, or more or leſſe added, to that number the moving ſight ſtayed at, (according as you ſet the firſt Horizon ſight to the declination) ſhall be the true latitude required. *Example.* Suppoſe on the ſame day and year as before, at the ſame Noon time, I ſet my Horizon ſight to juſt 10° of North declination, you ſhall find the movingſight to ſtay at 21. 30. neer to the corner, now if the Sun ſhine bright, and will caſt the ſhadow to the turning ſight, then ſet the Horiſon ſight at the declination, forward 10 or 20. degrees, then the moving ſight coming lower you, add but 20. or to that it ſhall ſtay at, and the ſumme ſhall be the latitude.

But

But it is moſt likely that it will be better to diminiſh it 20. degrees, then the moving ſight will ſtay about 2 - 30. on the Croſſe piece, and ſo much the better to caſt a ſhadow; for if you look through the Horizon and turning ſight to the Horizon, you ſhall find the ſhadow of the former edge of the moving ſhadow ſight, to ſtay at 2 - 30. to which if you add 20. the degrees diminiſhed, and 30. it makes 51 30. the latitude required as before.

Note alſo for better convenience of the ſhadow ſight, when you have found the true declination, as before is taught, ſet the moving object ſight to the ſame, on the Croſſe piece, counted from 00. towards the head leg, for like latitudes and declinations; and the other way for unlike latitudes and declinations, then obſerving as in a back obſervation, whereſoever the ſight ſhall ſtay, ſhall be the complement of the latitude required. If you add or diminiſh conſider accordingly.

Note likewiſe, when the declination is nere the ſolſtice, and the ſame way as the latitude is, and by diminiſhing, or otherwiſe the moving ſight ſhall fall beyond 00 on the Croſſe piece; Then having added 30. and the degrees diminiſhed together, whatſoever the ſight ſhall ſtay at beyond 00 muſt be taken out of the added ſum, and the remainder ſhall be the latitude required. *Example.*

Example. Suppose on the 11. of *June*, in the latitude of 51 30 north, for the better holding sake I diminish the declination 30 degrees, that is in stead of setting it to 23. 32. north declination, I set it to 6: 28 south then the sun being 62 degrees high will stay at 08. 30. beyond 00. the other way now 30 to be added, and 30 diminished, makes 60, from which take 8.30, rest 51 30 the latitude required.

XII. *To find a latitude with thred and plummet, or by an observation made without respecting the Horizon.*

Count the declination on the cross peece (and let 00 be the equinoctiall and let the declination which is the same with the latitude be counted toward the moveable leg, and the contrary the other way, as with us in north latitude, north declination is toward the moveable leg, and south declination the contrary and contrarily in south latitudes) and thereunto set the middest of the sliding object or horizon sight, then is the small hole on the turning sight and the small hole on the horizon-sight, two holes whereby the sun beams are to pierce to shine one on the other: then shall the thred shew you the true latitude of the place required. *Example.*

Suppose on the 11 of *Decem.* 1663, at noon I observe the noon altitudes set the middle of the Horizon sight to 23 32 counted from

from 00. toward the head leg end, then making the ſun beams to peirce through the hole of this, and the turning ſight, you ſhall find the plummet to play on 51. 30, the latitude required, holding the turning ſight toward the ſun.

Note alſo that here alſo you may avoid the inconvenience of the corner, or the great diſtance between the ſights, by the remedy before cited, in the back and forward obſervation.

For if you move it toward the head-leg, then the thred will fall ſhort of the latitude, if toward the moveable leg then it falls beyond the latitude, as is very eaſie to conceive of:

Thus you ſee all the uſes of the foreſtaff, and quadrant, and Mr. *Gunter*'s bow are plainly and properly applyed to this Triangular quadrant, that the ſame will be a Sector is eaſie to perſwade you to believe, and that all the uſes of a *Gunter*'s quadrant, are performed by it, is fully ſhewed in the uſe of the Joynt-rule, to which this may be annexed, the numbers ſigns and tangents and verſed ſigns makes it an excellent large *Gunter*'s rule, and the croſs peece is a good pair of large compaſſes to operate therewith; laſtly, being it may lie in ſo little roome it is much more convenient for them, with whom ſtowage is very precious, ſo I ſhall ſay no more as to the uſe

of

of it, all the reſt being fully ſpoke to in other Authors, to whom I refer you: only one uſefull propoſition to inure you to the uſe of this moſt excellent inſtrument, which I call the *Triangular Quadrant*.

Note that in finding the latitude, it is neceſſary to have a table of the ſuns declination for every of the four years, viz. for the leap year and the 1, 2 and 3d. after, now the table of the ſuns declination whereby the moneths are laid down, is a table that is calculated as a mean between all the 4 years, and you may very well diſtinguiſh a minute on the rule; now to make it to be exact I have fitted this rectifying table for every Week in the year, and the uſe is thus: hang the thred on the center pin, and extend the thred to the day of the moneth, and on the degrees is the ſuns declination, as near as can be for a common year, then if you look in the rectifying table for that moneth, and week you ſeek for you ſhall find the number of minutes you muſt add to or ſubſtract from the declination found for that day and year: Example, ſuppoſe for *April* 10. 1662. the ſecond after leap year, the rule ſheweth me 11.45, from which the rectifying table ſaith I muſt ſubſtract 3′ then is the true declination 11 42, the like for any other year. Note further that the ſpace of a day in the ſuns ſwifteſt motion being ſo much, you may

may consider the hour of the day also, in the finding of a latitude, by an observation taken of the Meridian, as anon you shall see that as the instrument is exact, so let your arithmetical calculation be also: by laying a sure foundation to begin to work upon, then will your latitude be very true also.

A Rectifying Table for the Suns declination.

	D	1 year	2 year	3 year	Leap year
January	7	Sub 5	Sub 2	Add 1	Add 4
	15	s 6	s 2	a 2	a 5
	22	s 7	s 3	a 1	a 6
	30	s 7	s 3	a 2	a 7
Februar	7	s 8	s 3	a 2	a 7
	15	s 8	s 4	a 2	a 8
	22	s 9	s 3	a 2	a 7
March	1	s 4	s 1	a 7	Sub 11
	7	s 3	Ad 3	Add 9	Sub 9
	15	Add 3	ad 1	Sub 9	Add 9
	22	a 2	Sub 4	Sub 9	ad 8
	30	a 1	Sub 4	Sub 9	ad 8
April	7	a 2	Sub 3	s 8	a 8
	15	a 2	s 3	s 8	a 7
	22	a 1	s 3	s 8	a 6
	30	a 1	s 3	s 6	a 5
May	7	a 0	s 2	s 6	a 5
	15	a 0	s 2	s 5	a 3
	22	a 0	s 1	s 3	a 3
	30	a 0	s 1	s 2	a 1
June	7	a 0	s 1	s 1	ad 0
	15	a 0	s 0	s 0	Sub 0
	22	s 1	s 0	ad 2	s 2
	30	s 1	Ad 1	ad 3	s 3

A Rectifying Table for the Suns declination

	D	1 year	2 year	3 year	Leap year
July	7	Sub 2	Add 1	Add 3	Sub 4
	15	s 1	a 1	a 5	s 5
	22	s 2	a 1	a 5	s 6
	30	s 2	a 2	a 6	s 7
August	7	s 3	a 2	a 7	s 8
	15	s 3	a 2	a 7	s 8
	22	s 3	a 3	a 8	s 9
	30	s 3	a 3	a 9	s 9
September	7	s 3	a 3	Add 9	Sub 9
	15	Add 3	Sub 3	Sub 9	Add 9
	22	a 2	s 4	s 9	a 8
	30	a 2	s 4	s 9	a 8
October	7	a 3	s 3	s 9	a 8
	15	a 2	s 3	s 8	a 7
	22	a 2	s 2	s 7	a 8
	30	a 2	s 2	s 7	a 8
November	7	a 1	s 1	s 6	a 7
	15	a 1	s 2	s 5	a 5
	22	a 1	s 3	s 4	a 3
	30	a 0	s 2	s 3	a 2
December	7	0	s 1	s 1	Add 1
	15	Sub 1	s 0	s 0	Sub 1
	22	s 1	s 0	Add 1	s 3
	30	s 3	s 0	Add 2	s 5

The Declination of the Sun being given; or rather the Suns Distance from the Pole, and the Complement of two Altitudes of the Sun, taken at any time of the day, knowing the time between: to find the Latitude.

Suppose on the 11. of *June*, the Sun being 66 degrees, 29′ distant from the North Pole, and the Complement of one altitude be 80. 30. and the Complement of another altitude 44. 13. and the time between the two observations just four hours; then say,

As the Sine of	90	00
To Sine of Suns dist. f. the Pole	66	28
So is the Sine of ½ time betw.	30	00
To the Sine of ½ the 3d. side	27	17½
	27	17½
of a Triangle as A B.	54	35
The side A P	66	28
The side P A	66	28
The side A B	54	35
whole sum	187	31
half sum	93	46
The differ. betw. ½ sum and AP side op. to inqu. Triangle	27	18
Then say, as S. of 90	90	00
To S. of Suns dist. from Pole	66	28

So

So is the Sine of A B	54	35
To the Sine of a fourth Sine	48	23
Then as that 4 to Sine of ½ ſum	93	46
So is S. of the difference	27	18
To a ſeventh Sine	37	44½
or the verſed Sine of P A B	77	02

Then to find Z A B Z B is	80	30
And Z A is	44	13
The former ſide A B is	54	35
Sum	179	18
half ſum	89	39
difference	09	09
As S. of 90	90	00
To Sine of A B	54	35
So is S. of Z A	44	13
To a 4th. Sine	34	38

As S. 4th.	34	38
To S. of ½ ſum	89	39
So is S. diff.	09	39
To a 7th. Sine	16	15¼
or to the verſ. ſine of Z A B	116	07

Then if you take P A B from Z A B there will remain Z A P 39 05

Then ſay again by the rule as before,

As

As the ſine of	90	00
To Co-ſine of Z A P	50	55
So is the Tang of A Z	44	13
To the Tangent of A C	37	04
which taken from A P	66	28
remaineth P C	29	24

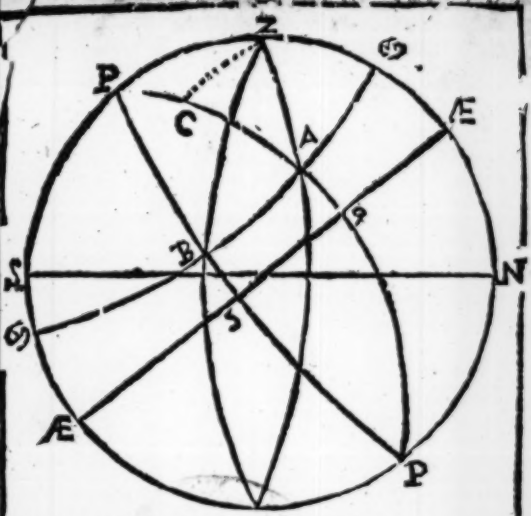
Then laſtly ſay,

As the Co-ſine of A C	52	56
To the Co-ſine of C P	60	36
So is the Co-ſine of Z A	45	47
To the Co-ſine of Z P	51	30

The Latitude required to be found. This Queſtion or any other may be wrought by the Sines and Tangents and verſed ſines on the rule, But if you would know more as concerning this or any other, you may be fully ſatisfied by Mr. *Euclid Spidal* at his Chamber at a Virginal Makers houſe in *Thred-needle Street*, and at the *Kings head* neer *Broadſtreet* end.

Vale.

FINIS.



The Triangle explained.

S P Z N a Meridian circl. Æ Æ the Equinoctial. ♋ B A ♋ the tropick of *Cancer*.
P B 5 P the hour circle of Five, *ante, mer.*
P A 9 P the hour circle of Nine, *ante, mer.*

Z B the Suns coaltitude at 5	80--30
Z A the Suns coaltitude at 9	44--13
P A & P B the Suns distance from the Pole on the 2 h. li. of 5 & 9	66--28
5-9 the equinoctial time between the two Observations	60--00
B A in proper measure is as found by the first measure working--	54--35
Z C a perpendicular on A P from Z	29--24
P Z the complement of the latitude that was to be found ---	38 -30